



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Southwest Fisheries Science Center
8604 La Jolla Shores Drive
La Jolla, CA 92037

28 July, 2003

FINAL CRUISE INSTRUCTIONS

NOAA Ship: NOAA Ship *McArthur II*

Cruise Number: AR-03-04

Cruise Dates: 29 July to 10 December 2003

Cruise Title: *Stenella* Abundance Research Project (STAR 2003)

The project is a marine mammal assessment survey with two vessels. The activities of the other vessel, NOAA Ship *David Starr Jordan*, are covered under a separate Announcement.

Study Area: The Eastern Tropical Pacific Ocean (ETP)

Itinerary:

Due to the current restrictions on posting port information for U.S. Government ships, we are unable to display the itinerary in this version of the Final Cruise Instructions. For the same reason, waypoints (Appendix II) are also not included in this version. General tracklines can be displayed, and are included in Appendix I.

Sponsoring Institution: NOAA/NMFS, Southwest Fisheries Science Center (SWFSC)
Protected Resources Division (PRD)

Cruise Description and Objectives

The primary objective of the *Stenella* Abundance Research cruise is to investigate trends in population size of those dolphin stocks most affected by the Eastern Tropical Pacific tuna purse-seine fishery. The project takes a multidisciplinary approach. Data on cetacean distribution, school size and school composition are collected to determine dolphin abundance. Oceanographic data are collected to characterize habitat and its variation over time. Data on distribution and abundance of seabirds, flyingfish, and marine turtles will further characterize the ecosystem in which these dolphins live. Skin biopsies of cetaceans provide a database for investigations of stock structure and phylogenetic relationships. Photographs document geographic variation in dolphins, and distribution of individual large whales.

Chief Scientist: Dr. Lisa T. Ballance, SWFSC (858) 546-7173, Lisa.Ballance@noaa.gov



PLAN OF OPERATIONS

1.0 DAYLIGHT OPERATIONS

1.1 Cetacean Survey - Line-transect survey methods will be used to collect abundance data. At the beginning of each day search effort should start on the trackline. The *McArthur* should travel at 10 knots (through the water) along the designated trackline. While on search effort, if the ship's speed through the water should deviate from this by more than one knot, the bridge personnel will notify the mammal team on watch or the Cruise Leader. A daily watch for cetaceans will be maintained on the flying bridge during daylight hours (approximately 0600 to 1800) by 6 mammal observers. Each observer will work in 2-hour rotations, manning each of the following 3 stations on the flying bridge for 40 minutes: a port side 25x150 binocular station, a center line data recorder position, and a starboard 25x150 binocular station.

1.1.1 Logging of Data - A log of observation conditions, watch effort, sightings, and other required information will be entered into a computer, hooked up to the ship's GPS (for course, speed and position information) and SCS (for weather and heading information). An "independent observer" may keep a separate watch of animals sighted during the cetacean survey operations, to be compared later with the observer team's data.

1.1.2 Breaking Trackline - On sighting a marine mammal school or other feature of biological interest, the Cruise Leader or marine mammal observer team on watch will request that the vessel be maneuvered to approach the school or feature for investigation. When the ship approaches a school of dolphins, the observers will make independent estimates of school size. Biopsy and photographic operations may commence from the bow, based on directions from the Cruise Leader or Senior Marine Mammal Observers. In some instances, the Cruise Leader will request the deployment of a small boat for biopsy, photographic or other operations (see 1.3).

It may occasionally be necessary to divert the ship's course from the established trackline during regular effort due to glare or adverse sea conditions. Under these circumstances, the ship may divert up to 30 degrees from the established course. This deviation may continue until the ship is 10 nm from the trackline, at which point the ship should turn back toward the trackline.

1.1.3 Resuming Effort - When the observers have completed scientific operations for the sighting, the ship will resume the same course and speed as prior to the sighting. If the pursuit of the sighting has taken the ship more than 10 nm from the trackline, the observers should be notified. The Cruise Leader or Senior Marine Mammal Observers may request that, rather than proceed directly toward the next waypoint, the ship take a heading of 20 degrees back toward the trackline.

1.2 Seabird Survey - Visual surveys of seabirds will be conducted from the flying bridge during daylight hours by two seabird observers. A log of sighting conditions, effort, sightings, and other required information will be entered into a computer interfaced with the ship's GPS (for course, speed, and position information) and SCS (for weather and heading information). Seabird observers will use both handheld and 25x150 binoculars.

1.3 Small Boat Work - A small boat may be necessary for biopsy sampling, photography, seabird collection, island surveys or marine turtle work. Deployment will be requested by the Cruise Leader on an opportunistic basis, possibly multiple times in a single day, providing the Commanding Officer concurs that operating conditions are safe. Unless the Commanding Officer allows otherwise, the small boat will remain within sight and radio contact at all times while deployed.

1.4 Biopsy Sampling - Biopsy samples for genetic analyses of marine mammals will be collected on an opportunistic basis. Copies of the necessary permits will be provided to the Commanding Officer prior to the start of the cruise. The animals to be sampled will either be approached by the research vessel during normal survey operations, will approach the vessel on their own, or will be approached by a small boat. Samples will be collected, from animals within 10 m to 30 m of the bow of vessels, using a dart fired from a crossbow or rifle. With the exception of the small boat and safety apparel, all necessary gear will be furnished and deployed by the scientific party.

1.5 Photography - Photographs of marine mammals will be taken on an opportunistic basis. These will be used to study social behavior and movement patterns of identified individuals, and to study geographic variation. Copies of the necessary permits will be provided to the Commanding Officer prior to the start of the cruise. The animals to be photographed will either be approached by the research vessel during normal survey operations, will approach the vessel on their own, or will be approached by a small boat. With the exception of the small boat and safety apparel, all necessary gear will be furnished by the scientific party.

1.6 Marine Turtle Research - A visual survey for marine turtles will be carried out by the mammal and seabird observers on the flying bridge during all daylight hours. Data will be recorded in both mammal and seabird databases. Marine turtles will be captured, either from the research vessel using a long-handled net, or from a small boat, on an opportunistic basis at the discretion of the Cruise Leader. Turtles will be measured, weighed, tagged, and a small amount of blood may be collected for genetic analysis and hormonal studies. Turtles may be examined with ultrasonography to check reproductive condition. All turtles will be subsequently released. At the discretion of the Cruise Leader, one or more turtles may be fitted with a satellite transmitter and released. The transmitter will be attached to the carapace with fiberglass resin. Also at the discretion of the Cruise Leader, a stomach lavage may be performed on select turtles. With the exception of the small boat and safety apparel, all necessary gear will be supplied and operated by the scientific party. Copies of the necessary permits will be provided to the Commanding Officer prior to the start of the cruise.

1.7 Seabird Colony Censuses - Nesting site surveys may be conducted by the scientific party at locations to be determined by the Cruise Leader. The vessel's small boat(s) may be required for transporting observers to and from nesting sites for ground counts (on foot) of the seabird colonies. Potential islands include: La Plata, Ecuador; Malpelo, Colombia; Cocos, Costa Rica; Wenman and Culpepper, Ecuador. Growing feathers (one per bird) may be collected from up to forty individuals from each of several different species on each of the following colonies: La Plata, Ecuador; Malpelo, Colombia; Cocos, Costa Rica; Wenman and Culpepper, Ecuador. Copies of the necessary permits will be provided to the Commanding Officer prior to the start of the cruise.

1.8 Collection of Fish - Fish will be collected on an opportunistic basis at the discretion of the Cruise Leader. While underway, trolling gear will be used when conditions permit. While stationary, hook-and-line gear will be used. Fish will be measured, sexed, and stomach contents will be examined and recorded by scientific personnel. The Cruise Leader will be responsible for the disposition of the catch, in accordance with NOAA Administrative Order 202-735B, dated January 9, 1989. All flyingfish specimens that land on the decks will be collected by the scientific party and frozen. We request that any individual who finds a flyingfish on deck please notify the Cruise Leader.

1.8.1 Collection for Food-web Isotope Project – Samples from the same fish collected under 1.8 will be taken for the Food-web Isotope Project. The date, location, time of day, species, length, and sex of each fish will be recorded by scientific personnel. The stomach will be removed and frozen, with stomach contents intact, after being examined under 1.8. A piece of the liver and a core of white muscle will also be removed and frozen. Approximately 10 cu ft of freezer space is required to store the samples. R. Olson, IATTC, will provide supplies and instructions.

1.9 Salvage of Marine Mammals - Marine mammal body parts may be salvaged on an opportunistic basis at the discretion of the Cruise Leader. This includes whale and dolphin ivory and carcasses. In the event that this occurs, scientific freezer space will be needed to store the mammal body parts. Permits to salvage and import marine mammal parts will be present on the vessel. All marine mammal specimens obtained will be archived at the SWFSC, but may be released on extended loan to recognized research institutions according to existing guidelines.

1.10 Buoys - The ship may be required to approach equatorial buoys to repair or maintain scientific instruments for the Tropical Atmosphere Ocean (TAO) project. This will occur on an opportunistic basis at the discretion of the Cruise Leader, providing the Commanding Officer concurs that conditions are safe for such operations.

1.11 Acoustics – There will be no backscatter or ADCP data collected from the ship during this

cruise.

1.11.1 Sonobuoys - Sonobuoys may be deployed periodically from either the *McArthur* or a small boat on an opportunistic basis, at the discretion of the Cruise Leader. With the exception of the small boat, all of the necessary equipment will be supplied and operated by scientific personnel.

1.11.2 Towed Array - A small hydrophone array will be towed during daylight hours during Legs 3, 4, and 5 of the cruise to collect data on cetacean vocalizations, and to assess the acoustic characteristics of the vessel for future Protected Resources Division projects. The array will be deployed each morning prior to the start of visual observations, and will be retrieved each evening after search effort ends (and whenever increased maneuverability is required). The array will be wound onto a hydraulic-powered winch supplied by the SWFSC. A team of two acoustic technicians will monitor the array, record sounds made by cetaceans, and localize their positions. The cruise leader may request that the vessel be turned and that visual observers search for acoustically detected cetaceans. During leg 3, the cruise leader will work with the Commanding Officer to assess the maneuvering limits of the ship for this array.

1.12 Oceanography - Oceanographic sampling will be done by the oceanographer and Ship's Survey Technician, and other scientists as designated by the cruise leader while underway.

1.12.1 XBT Drops - There will be three XBT drops per day, at 0900, 1200 and 1500 hours local ship time, or as requested by the Cruise Leader. The XBT's will be provided by SWFSC, and the launcher/computer will be provided by the ship. XBT's will be conducted by one person per drop (either by a member of the scientific party or by the Survey Technician). At least one drop per day will be conducted by the ship's Survey Technician. If the vessel is stopped at the scheduled launch time, the drop will be delayed until the ship is again underway. If the vessel is not planning to move within half an hour, the individual performing the drop should be notified and the drop will be delayed or canceled, at the discretion of the Cruise Leader.

1.12.2 Surface Water Samples - A surface water sample for chlorophyll a analysis and a bucket temperature will be taken at 0900, 1200, 1500, and 1800 hours local ship time daily. These samples will be taken by either a member of the scientific party or the Survey Technician (schedule to be determined).

1.12.3 Thermosalinograph Sampling - The ship will provide and maintain a thermosalinograph (TSG), which is calibrated and in working order, for continuous measurement of surface water temperature and salinity. A data acquisition system (WinDACS) furnished and maintained by scientific personnel will be connected to the TSG output from the Sea-Bird Electronics interface box, via a cable with a 9-pin female d-sub connection (provided by ship). This computer (located in the aft wet lab) will receive the raw data, with the NMEA position string attached to each record. Additionally, this computer will be connected to the ship's LAN, in order to synchronize with the ship's time server. The Scientific Computing System (SCS) shall also collect this information. We request a specific file with data collected once every 60 seconds: date(GMT), time(GMT), lat(decimal), lon(decimal), surface temp(TSG), surface salinity(TSG), true wind speed and true wind direction. All SCS data will be provided to the SWFSC oceanographer following each leg of the cruise.

1.12.4 Test underway CTD profiler - Occasionally during the cruise, an underway CTD profiler may be tested by the oceanographer. The system is under development at SIO and is self-contained, using a small, 110-volt electric fishing reel. The testing times will be determined by the Cruise Leader and/or ship command, so as not to interfere with the primary objective of the survey. This operation may require assistance from the deck department, which will be requested in advance by the Cruise Leader.

1.12.5 Argo Buoy deployments - Argo Buoy deployments - A small number of Argo array buoys, part of the Global Climate Observing System/Global Ocean Observing System (GCOS/GOOS) and part of the Climate Variability and Predictability Experiment (CLIVAR) and the Global Ocean Data Assimilation Experiment (GODAE), may be deployed by scientific personnel to help fill in the coverage gap in the ETP for this program. Times and locations of deployment will be

determined by the Cruise Leader in consultation with the Command. Buoys will be deployed off the stern by the scientific party after notifying the bridge.

1.12.6 Drifter Buoy deployments – 12 drifter buoys will be deployed by scientific personnel for the NOAA/AOML/Global Drifter Center at predetermined locations. Final deployment locations will be determined by the Cruise Leader. Buoys will be deployed off the stern by the scientific party after notifying the bridge.

2.0 NIGHT OPERATIONS

A chronological record of oceanographic and net tow stations will be kept by the ship (Marine Operations Log) with dates and times in GMT. The ship will provide a copy of the operations log and cruise weather log to the SWFSC oceanographer at the completion of the cruise. Setup (including termination), maintenance and operation of the SeaBird CTD (conductivity- temperature-depth) system, including collection of oceanographic data and data processing, will be conducted by the ship's Electronic and Survey Technicians. The crew of the vessel will operate all deck equipment and be responsible for the condition of the conducting cable of the winch. All instruments, their spares and spare parts provided by the ship must be maintained in working order and, if applicable, have current calibrations (within previous 12 months).

2.1 CTD Stations - Two CTD stations will be occupied each night. CTD data and seawater samples will be collected using a SeaBird 9/11+CTD with rosette and Niskin bottles fitted with silicone tubing and o-rings (supplied by oceanographer). All casts are to 1000 meters, with the descent rate at 30m/min for the first 100m of the cast, then 60m/min after that, including the upcast between bottles. From each cast, chlorophyll samples (to 200 m) and salinity samples (2 to 6 samples per cast, at least at 500 and 1000 m or bottom) will be collected and processed on board. The 265ml chlorophyll samples will be filtered onto GF/F filters, placed in 10ml of 90% acetone, refrigerated for 24 hours, and then analyzed on a Turner Designs model 10AU field fluorometer. Nutrient samples (0 - 500 m) will be collected, frozen, and stored on board. Both the Survey Technician and oceanographer will participate in sample collection (chlorophylls and nutrients) and analysis of chlorophyll samples. The Survey Technician will collect and analyze salts and record them in the log provided, when one case of 24 bottles is full and has been temperature stabilized in the location of the salinometer. Cast times are subject to change since sunrise and sunset will vary during the cruise. Additional CTD stations may be requested by the Cruise Leader in areas of special interest.

2.1.1 Pre-Daylight cast - The morning cast (1000 m) will begin approximately one and one-half hours prior to sunrise. The exact starting time will be determined the evening before, by the FOO, and posted in the Plan of the Day. The time should not be changed more than 15 min. from the previous day, even if sunrise changes more than this. This schedule may be modified by the oceanographer. Niskin bottle water samples will be collected at seven light depths and five additional standard depths, between the surface and 1000 meters. These depths will be determined by the oceanographer just prior to each cast by entering the ship's position into a computer program. Primary productivity will be measured by radioactively labeled carbon uptake methods performed by the oceanographer. The seven samples will be spiked with ^{14}C , incubated on deck for 24 hours, filtered, and stored for later analysis at the SWFSC. The Niskin bottles (#1-7) will be rinsed with freshwater after each cast and acid-washed at the end of each leg by the Survey Technician. The oceanographer will be trained in the use of radioactivity by SWFSC prior to departure, and will handle and be responsible for radioactive material. A copy of the SWFSC's NRC license for use of radioisotopes will be provided to the Commanding Officer. All radioactive waste will be stored in secured drums and returned to San Diego (i.e. no disposal of radioactivity at sea).

2.1.2 Post Effort Cast - An evening CTD cast, to 1000 meters, will be conducted a minimum of one hour after sunset, to the nearest quarter hour. This time will be determined the prior evening by the FOO, and listed in the Plan of the Day. Bottle samples will be collected from 12 standard depths (0, 20, 40, 60, 80, 100, 120, 140, 170, 200, 500, 1000 m). Samples for chlorophyll, nutrients and salts will be taken as listed above.

2.2 Filtering water samples - Concurrent with the evening CTD station, small samples of particulate organic matter (POM) and zooplankton will be collected by the oceanographer from surface

waters for the Food-web Isotope Project. Surface water collections will be placed in a pressurized carboy filtration system, and left for an hour. For POM collection, the water will be prefiltered to remove large particles, then filtered from the carboy on to 25-mm glass fiber filters. The glass fiber filters will be stored frozen. For zooplankton collection, seawater collected from the sea surface will be poured over a home-made nitex filter and stored frozen. R. Olson, IATTC, will provide the sampling equipment and instructions for this and other sampling for the Food-web Isotope Project.

2.3 Net Sampling - Net tows will be conducted by the scientific party as assigned by the cruise leader, with the assistance of the Survey Technician and a winch operator from the vessel. The schedule for these tows may vary by leg, and may need to be modified by the cruise leader.

2.3.1 Dipnetting - Concurrent with the evening CTD station, dipnetting for surface fauna will be conducted by scientific personnel. This station is to begin no sooner than one full hour after sunset and will require one full hour of time to complete. One or more deck lights will be necessary to illuminate the water surface in the area of dipnet sampling. Samples will be preserved, labeled, and stored in the scientific freezer. Scientists may also collect surface fauna for aquarium tanks on board. All live organisms will be given to the Scripps Aquarium upon return to San Diego.

2.3.1.1 Dipnetting for Food-web Isotope Project – Surface fauna collected under 2.3.1 will be shared with the Food-web Isotope Project, at the discretion of the Cruise Leader and the scientist directing this activity. Samples will be labeled and stored in the scientific freezer.

2.3.2 Manta Tow - A surface manta net tow will be conducted for fifteen minutes immediately following the post-sunset CTD station and dipnetting. Estimated completion time for the entire procedure is 30 minutes. The net will be deployed on the starboard side via a winch with a block suspended from a crane. Samples will be preserved in formalin, labeled, and stored by the oceanographer in containers provided by the SWFSC until the vessel returns to San Diego.

2.3.3 Bongo Tow - An oblique Bongo tow will be conducted after the Manta tow, for 45 minutes, to a depth of 200 meters (wire out 300 m). Samples will be handled by the oceanographer (preserved in formalin, labeled and stored in containers provided by the SWFSC until the vessel returns to San Diego).

2.4 Transit - When scientific operations are complete for the night, the ship will resume course along the trackline, at a speed determined by the Cruise Leader, until it is necessary to stop for the morning (pre-daylight) CTD station.

3.0 SCIENTIFIC PERSONNEL

3.1 Chief Scientist - The Chief Scientist is Dr. Lisa T. Ballance, SWFSC, at phone (858) 546-7173. The Cruise Leader is the authorized representative of the Chief Scientist, with all the designated powers and responsibilities of the Chief Scientist.

The Chief Scientist is authorized to alter the scientific portion of this cruise plan with the concurrence of the Commanding Officer, provided that the proposed changes will not: (1) jeopardize the safety of personnel or the ship, (2) exceed the time allotted for the cruise, (3) result in undue additional expense, or (4) change the general intent of the project.

3.2 Participating Scientists - Please refer to Appendix 3.

3.3 Personnel Switches - There will be two teams of marine mammal and seabird observers for the cruise. Each team will spend one-half of the cruise on board each ship, so as to have equal calibration time with the helicopter aboard the *David Starr Jordan*. The exchange of observer teams will take place during the inport in Puntarenas, Costa Rica. The transfer of observers and their personal gear will occur on the day of arrival into port (30 September).

For all legs, the incoming scientific personnel will board the ship on the day of its arrival in port, the outgoing personnel will stay in a hotel or make other plans.

3.4 Passports - Each member of the scientific party will have a valid passport for the cruise. Permanent SWFSC personnel will have a government passport and orders for official travel (which includes any time on the ship) and a personal passport for recreational travel. All personnel will have a birth certificate (or copy) or picture identification aboard as a backup for the passport, for issuance to and from foreign ports. All scientific personnel will have government identification cards.

3.5 Medical Forms - All scientific personnel will complete a NOAA Health Services Questionnaire (NHSQ) prior to embarking, as per NC Instruction 6000. This form will be routed through MOP Health Services prior to the cruise.

4.0 EQUIPMENT

4.1 Supplied by scientific party:

1. Nine 7x50 hand-held binoculars
2. Three 25x150 binoculars and stands
3. One 20x60 hand-held gyro-stabilized binoculars
4. Two observer chairs for flying bridge
5. Portable wooden desk units for flying bridge
6. Video camera and tapes
7. One Digital EOS SLR camera, and 2 35mm cameras with lenses, 35mm film
8. Three handheld radios
9. Laptop computers (2 - 3) for scientific party e-mail use
10. 2 desktop computers mounted below decks with CAT5 KVM extension units at CPUs and at remote console units on the flying bridge.
11. Portable GPS component as backup to ship's system
Crossbows, biopsy darts and tips, sample vials and storage solution (DMSO with MSDS); Rifles, 9mm blank charges; 1 notebook computer for biopsy data entry and thermal label printer; portable genetics lab with equipment and chemicals for extracting DNA from skin biopsy samples (detailed list to be provided as well as MSDS for all chemicals)
1. Two 24-liter liquid nitrogen tanks (for biopsy sample preservation)
12. Two 30-liter nitrogen tank (for biopsy sample preservation)
13. Turtle capture device and sampling gear
14. Calipers, flipper tags and applicators, scale, and blood collection equipment for turtle research
15. up to 20 satellite transmitters for turtles (must be stored in freezer)
16. Fiberglass resin, catalyst, cloth and supplies for attaching turtle transmitters
17. Laptop computer (1) and comm. box for programming turtle satellite transmitters
18. Telonics handheld receiver (400-465 MHZ) for turtle satellite transmitters
19. 1 or 2 automobile tires for holding turtles
20. Small bench top centrifuge for turtle blood
21. Two long-handled dip nets and sample containers
22. 1 -50 gallon aquarium tank, or fishbox aquarium (for outside deck space)
23. Formalin and sodium borate
24. Manta tow frame, net (and spares) and glass sample containers
25. Bongo nets (including spare), frame, and glass sample jars
26. Salinity sample bottles, square w/plastic insert beneath screw cap (100 ea. - 4 cases of 24 plus 6 spares)
27. XBT probes (Deep Blues) - 30 cases (1¹/₉ pallets)
28. Computers for environmental (WinDACS) data acquisition
29. Fluorometer (TD10AU) and one backup (TD10) for discrete chlorophyll *a* analysis
30. Lab apparatus, logs and supplies for discrete chlorophyll *a* analysis
31. Wormley standard seawater vials for salinometer calibration (40 vials)
32. Acetone, phenethylamine (mixture), scintillation cocktail, hydrochloric acid, Triton x-100
33. ¹⁴C-bicarbonate (15 mCi total) and copy of NRC Materials License 04-29022-01
34. Primary productivity incubator (approx. 2' x 2' box, 48" high)

35. Nutrient and productivity sample vials
36. Spare Bucket Thermometers (2)
37. Safety (MSDS's) and clean up materials for ^{14}C and all chemicals, incl. a Geiger counter
38. Oceanographic data logs and log books
39. Two pallets of sonobuoys (5'x5'x5', 1200 lbs when full)
40. Two sonobuoy receivers
41. DAT recorder and laptop PC for sonobuoys
42. Hydrophone array and directional hydrophone
43. Aluminum hydraulic winch for hydrophone array, 3' x 4' footprint, approx. 400 lbs.
44. Hansen Coupling Division male LL6-HKP/LL8-HKP ends to quick connect style connectors on 50' hose to hydraulic power supply for acoustic winch
45. Acoustics recording equipment, including: mixer and recording rack, laptop computers (3), Hi-8 tapes, accessory equipment.
46. Permits for specimen collection and foreign research (copies of which will be provided to the Commanding Officer)
47. Computer data storage media (diskettes, etc.)
48. 5 reams of paper
49. Converted shipping container Oceanography lab with hoses for fresh/salt water connection and for drainage overboard, and with extension cords for power supply connection.
50. 3 to 4 Fish Boxes for Oceanography equipment storage.
51. Argo buoys: approximately 25
52. Underway CTD
53. Sea-Bird Electronics interface box
54. Drifter buoys (12 on 3 pallets where each box is 42"x42"x31", 155 lbs. and contains two drifters)
55. -80 degree freezer for biological samples (approximately 4' long x 2.5' wide x 3.5' high)

4.2 Supplied by ship - We request the following systems, technical support, sufficient consumables, back-up units, and on-site spares. All measurement instruments are assumed to have current calibrations and we request that all pertinent calibration information be included in the data package.

1. 3 Insulated CAT5 cables running from location site for CPUs to the flying bridge consoles
2. Power, ship's GPS, and ship's SCS connections to CPUs running the flying bridge consoles
3. Space inside for CPUs, keyboards, and monitors referred to in item #2
4. Canopy on flying bridge
5. Three handheld radios (as spares)
6. Small boat for biopsy sampling, photography, seabird collection, seabird colony censuses and marine turtle research
7. Deck lighting for dipnetting
8. Freezer space for water and biological samples (45 cu. ft.)
9. Hydrographic winch with minimum 400m cable (1/4" to 3/8" dia.) for net tows
10. Deck space for 2 manta frames (1 spare), one bongo net frame (and pair of nets attached)
11. Bottom depth checking (during CTD casts and net tows in depths less than 2000m).
12. Seabird 9/11+ CTD system including rosette with Niskin bottles (2.5L, 12 each)
13. Back-up SeaBird CTD, frame with weights and Niskin bottles (any size, 12 each)
14. Oceanographic winch with minimum 1500 meters of .322" conducting wire, terminated to CTD
15. SeaBird Micro thermosalinograph (SBE45) and connection from Interface box to WinDACS computer in aft wet lab (9-pin female D-sub)
16. SEAS system with XBT launcher
17. Weather protected storage space for 30 boxes of XBTs - can include deck space for 3-4 fish boxes (48"Wx44"Lx30"H) on main deck.
18. Scientific Computing System for data collection
19. Salinometer, in properly maintained working order
20. Access to clean, rust-free seawater for primary productivity incubator on aft mast deck (near Oceo van)
21. Space in sunny location for primary productivity incubator on aft mast deck (near Oceo van) (2'x2')
22. Installation of SWFSC-supplied sonobuoy antenna and coax cable to plot room
23. Ship's GPS connection to plot room for acoustics computers
24. Exterior storage space for 2 pallets of sonobuoys (see item 40 above)

25. Space for and installation of winch for hydrophone array
26. Hansen Coupling Division female LL6-HKP/LL8-HKP ends to quick connect style connectors on hose from hydraulic power supply for acoustic winch
27. Marine Operations and Deck Log/Weather Observation sheets, filled out by Deck Officers
28. Designated workspace in plot room for 1 or 2 scientists
29. Copy Machine
30. Power, LAN line and water (fresh or salt) to Oceanography van.
31. Network access to a printer for biopsy sampling computer
32. Small refrigerator-freezer for storage of chlorophyll samples in seawater lab
33. Storage space for 25 Argo buoys and 12 drifter buoys (see items 52 and 55, Equipment Supplied by Scientific Party)
34. Connection of Micro thermosalinograph to the SBE interface box, including GPS input (append to data string with raw temp, conductivity, and calculated salinity)

4.3 Installation and Maintenance - Prior to departure from San Diego the Chief Scientist and members of the scientific party may board the vessel, with permission of the Commanding Officer, to test survey equipment and environmental sensors, set up equipment, and assemble equipment and work spaces on flying bridge.

The Cruise Leader will assign a member of the scientific party to check the temperature of the scientific freezers twice per day, and to notify the Cruise Leader in the event of significant changes.

4.4 Radioisotopes - Small amounts of ^{14}C radioisotope will be used in the primary productivity experiments to be conducted within the oceanographic laboratory van on the McArthur II (-02 deck) and in a labeled tank on the same deck. The use of these radioisotopes is authorized by, and will be in accordance with, the conditions of U.S. Nuclear Regulatory Commission, under the Radioactive Materials License number 04-29022-01, issued to SWFSC. The Application for Authorization to use Radioactive Material on NOAA Ships will be provided to the Pacific Marine Center according to the current NOAA Radioactive Material policy. Valerie Andreassi and Candice Hall will be authorized users for radioisotopes. In accordance with this license, these radioactive materials are authorized for use at sea without geographic restriction. A copy of the license will be carried aboard the ship.

The Cruise Leader will ensure that a wipe test of all areas and surfaces exposed to chemicals that contain ^{14}C is conducted by oceanographic personnel at the end of each leg, after any spillage, and after the cruise. The results of this wipe test shall be forwarded to the Director, Pacific Marine Center and Commanding Officer, NOAA Ship *McArthur*.

The Chief Scientist shall submit operating and emergency procedures prior to commencing the project. These should include instructions on handling, controlling access to the material, monitoring laboratory contamination, providing notification requirements, keeping records, and decontaminating facilities and personnel.

4.5 Hazardous Materials - The Chief Scientist shall be responsible for complying with NC Instruction 6280a, Hazardous Materials and Hazardous Waste; policy, guidance, and training, dated February 4, 1991, paragraph 7.g and paragraph 9. By Federal Law, the ship may not sail without a complete inventory of Material Safety Data Sheets (MSDS's) and appropriating neutralizing agents, buffers, and/or absorbents in amounts adequate to address spills of a size equal to the amount of chemicals brought on board. The Chief Scientist will provide the Commanding Officer with a copy of all MSDS's prior to the cruise.

5.0 DATA RESPONSIBILITIES

5.1 Collection of Data - The Chief Scientist will receive all original data related to the project. The Chief Scientist will in turn furnish the Commanding Officer with a complete inventory listing of all data gathered by the scientific party, detailing types of operations and quantities of data prior to departing the ship. All data gathered by the vessel's personnel that are desired by the Chief Scientist will be released to her, including supplementary data specimens and photos gathered by the scientific crew.

5.2 Dissemination of Data - The Chief Scientist is responsible for the quality assurance, disposition, and archiving of data and specimens collected aboard the ship. The Chief Scientist is also responsible for the dissemination of copies of these data to cruise participants and to any other requesters. The SWFSC cruise report will be submitted according to SWFSC procedures to appropriate persons and groups.

5.3 Foreign Research Clearance Reports - A request for research clearance in foreign waters has been submitted by SWFSC. The Chief Scientist is responsible for satisfying the post cruise obligations associated with diplomatic clearances to conduct research operations in foreign waters.

5.4 Evaluation Form - The Chief Scientist will complete the Ship Operations Evaluation Form and forward it to the Office of Marine and Aviation Operations. The Commanding Officer will provide this form.

6.0 ADDITIONAL INVESTIGATIONS AND PROJECTS

6.1 Ancillary Projects - Ancillary projects are secondary to the objectives of the cruise, should be treated as additional investigations, do not have representation aboard, and are accomplished by the ship's force. Ancillary tasks will be accomplished in accordance with the NOAA Fleet Standing Ancillary Instructions. Any additional work will be conducted so as not to interfere with operations as outlined in these instructions. The Chief Scientist will be responsible for determining the priority of additional work relative to the primary project with approval from the Commanding Officer.

7.0 COMMUNICATIONS

7.1 Radios - The Cruise Leader or designee may request, from the Commanding Officer, the use of radio transceivers aboard the ship to communicate with other vessels and aircraft, if necessary.

SWFSC will supply their own handheld radios for intra-ship communication and communication with the small boats. However, the Cruise Leader may request the use of the ship's handheld radios if the supplied radios should fail.

7.2 Telephone - The Cruise Leader or designee may require access to the ship's INMARSAT or cellular telephone systems with permission from the Commanding Officer. The Commanding Officer will provide the Cruise Leader with a log of all INMARSAT calls made from the ship for SWFSC business at the end of each leg. In accordance with the Communications Reimbursement Policy, SWFSC will pay these charges via a transfer of funds from SWFSC to the ship.

7.3 Electronic Mail - All members of the scientific party will have access to e-mail for communications with persons not aboard the ship. The amount of such communication traffic will be determined by the Chief Scientist.

E-mail communication between the *Jordan* and *McArthur* is essential and will be assumed to be in working order. Voice communications between scientific personnel on the two ships may be required at the discretion of the Cruise Leader. A regular communication time between the vessels may be requested.

7.4 Routine Reports - The Cruise Leader will submit a weekly cruise report, along with time and attendance for the scientific party, to the Survey Coordinator each Thursday during the cruise via e-mail or, if e-mail is not functioning properly, via fax. The Survey Coordinator at SWFSC will be on the distribution list for the ship's noon position reports.

8.0 MISCELLANEOUS

8.1 Pre-cruise Meeting - A pre-cruise meeting between the Chief Scientist (and her staff) and the

Commanding Officer (and his staff) will be held prior to the start of the cruise to identify operational requirements (*i.e.* overtime, modifications, repairs, or procurements).

8.2 Underway Meetings - Meetings between the Commanding Officer (and other officers) and the Cruise Leader should occur at the beginning and end of each leg to discuss and solve any problems or changes that may arise. Additional meetings should occur as needed.

8.3 Debrief - A post-cruise debriefing will be held between the Chief Scientist and the Commanding Officer. If serious problems are identified, the Commanding Officer shall notify the Marine Operations Center, Pacific, in the most direct means available. The Chief Scientist shall document identified problems in the Ship Operations Evaluation Form. The time and date for the debrief will be determined toward the end of the cruise.

8.4 Time and Attendance - Time and Attendance will be filled out by the SWFSC timekeeper while the ship is at sea, based on information transmitted by the Cruise Leader to the Survey Coordinator. Scheduled overtime is authorized for Saturdays, Sundays and holidays. Irregular overtime will be authorized by the Cruise Leader as required. SWFSC personnel are authorized per diem at the rate of \$2.00 per day to be paid via a travel voucher at the termination of the cruise. Task Number 2003 30-51-0002-00-00-00-00 A8L5S1H-P29 will pay for per diem and overtime for any SWFSC permanent, term, or temporary employees: Cruise Leaders, Marine Mammal and Seabird Observers and oceanographers. Regular salary for these personnel will be paid by the CYOP task from which they are normally paid.

Time and Attendance for Aquatic Farms contract employees will be based upon a pre-determined schedule. If events of the cruise alter the planned schedule, the Cruise Leader will notify the Survey Coordinator, and appropriate changes will be brought to the attention of Aquatic Farms.

8.5 Navigation - Primary control will be GPS, also dead reckoning based on visual bearings and radar ranges when possible.

8.6 Scientific Spaces - The Cruise Leader shall be responsible for the proper upkeep and cleaning of all spaces assigned to the scientific party, both laboratory and living spaces, throughout the cruise. The Cruise Leader or Chief Scientist will make berthing assignments for scientific personnel on a per-leg basis, with approval of the Commanding Officer.

For further information contact LTJG Jason Appler, Survey Coordinator, Southwest Fisheries Science Center, National Marine Fisheries Service, NOAA, 8604 La Jolla Shores Drive, La Jolla, CA 92037; Phone (858) 546-5672. More information about the cruise and project can also be found at the STAR website: <http://swfsc.nmfs.noaa.gov/prd/star/default.htm>

Prepared by: /S/**Jason Appler**
LTJG Jason Appler
Survey Coordinator, SWFSC

Dated: 28-July-2003

/S/**Lisa T. Balance**
Dr. Lisa T. Ballance
Chief Scientist, SWFSC

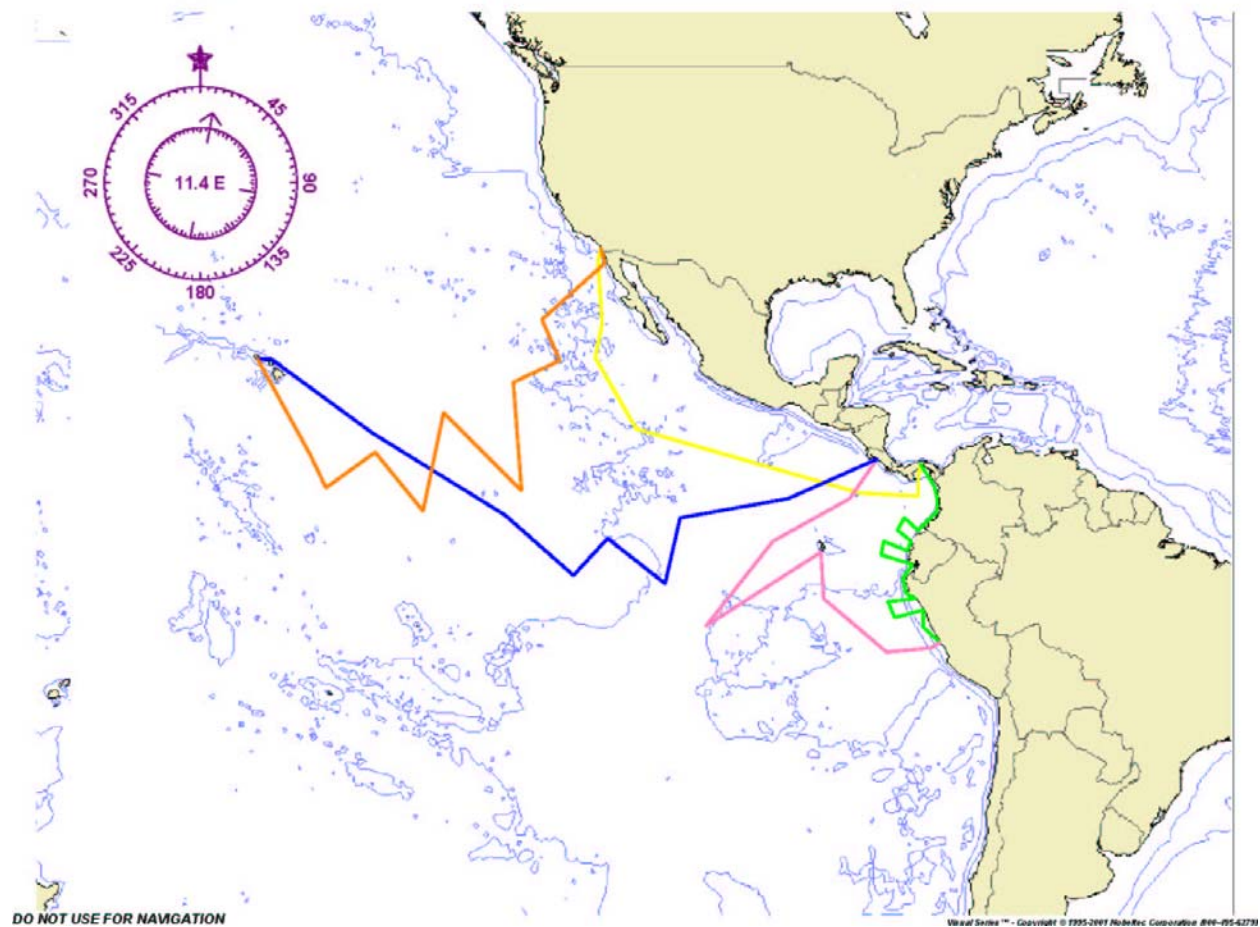
Dated: 28-July-2003

Approved by: /S/**Michael Tillman**
Dr. Michael Tillman,
Science Director, F/SWR

Dated: 28-July-2003

Approved by: /S/**Nicholas A. Prahl**
RADM Nicholas A. Prahl, NOAA
Director Marine Operations Pacific

Dated: 13-August-2003



Appendix 3.

Personnel for the Stenella Abundance Research Project 2003 NOAA Ship McArthur II

McArthur II Leg 1: San Diego, CA – Honolulu, HI

Position	Name	Affiliation	Berth
Cruise Leader	Lisa Ballance	SWFSC	.
Senior Mammal Observer	James Cotton	SWFSC	.
Senior Mammal Observer	Gary Friedrichsen	AFL	.
Mammal Observer	Ernesto Vazquez	AFL	.
Mammal Observer	Chris Cutler	AFL	.
Mammal Observer	Cornelia Oedekoven	AFL	.
Mammal Observer	Beth Goodwin	AFL	.
Seabird Observer	Michael Force	AFL	.
Seabird Observer	Richard Pagen	AFL	.
Oceanographer	Candice Hall	AFL	.
Acoustician	Jessica Redfern	SWFSC(Post Doc.)	.
Acoustician	TBD	.	.
Foreign Observer/Visiting Scientist	Mary Tapia	Ecuador	.
Foreign Observer/Visiting Scientist	Eric Ward	University of Washington	.
Foreign Observer/Visiting Scientist	TBD	.	.

McArthur II Leg 2: Honolulu, HI – Puntarenas, Costa Rica

Position	Name	Affiliation	Berth
Cruise Leader	Sarah Mesnick	AFL	.
Senior Mammal Observer	James Cotton	SWFSC	.
Senior Mammal Observer	Gary Friedrichsen	AFL	.
Mammal Observer	Ernesto Vazquez	AFL	.
Mammal Observer	Chris Cutler	AFL	.
Mammal Observer	Cornelia Oedekoven	AFL	.
Mammal Observer	Beth Goodwin	AFL	.
Seabird Observer	Michael Force	AFL	.
Seabird Observer	Richard Pagen	AFL	.
Oceanographer	Candice Hall	AFL	.
Acoustician	TBD	.	.
Acoustician	TBD	.	.
Foreign Observer/Visiting Scientist	Mari Rosales	Cal State University, LA	.
Foreign Observer/Visiting Scientist	TBD	.	.
Foreign Observer/Visiting Scientist	TBD	.	.

McArthur II Leg 3: Puntarenas, Costa Rica – Callao, Peru

Position	Name	Affiliation	Berth
Cruise Leader	Susan Chivers	SWFSC	.
Senior Mammal Observer	Richard Rowlett	SWFSC	.
Senior Mammal Observer	Juan Carlos Salinas	AFL	.
Mammal Observer	Erin LaBrecque	AFL	.
Mammal Observer	Anne Douglas	AFL	.
Mammal Observer	Holly Fearnbach	AFL	.
Mammal Observer	.	AFL	.
Seabird Observer	Sophie Webb	AFL	.
Seabird Observer	Chris Hoefer	AFL	.
Oceanographer	Candice Hall	AFL	.
Acoustician	Shanon Rankin	AFL	.
Acoustician	Megan Ferguson	SIO	.
Foreign Observer/Visiting Scientist	Paul Fiedler	SWFSC	.
Foreign Observer/Visiting Scientist	Richard Condit	Smithsonian Tropical R.I.	.
Foreign Observer/Visiting Scientist	Hadoram Shirihi	.	.

McArthur II Leg 4: Callao, Peru – Panama City, Panama

Position	Name	Affiliation	Berth
Cruise Leader	Barb Taylor	SWFSC	.
Senior Mammal Observer	Richard Rowlett	SWFSC	.
Senior Mammal Observer	Juan Carlos Salinas	AFL	.
Mammal Observer	Erin LaBrecque	AFL	.
Mammal Observer	Anne Douglas	AFL	.
Mammal Observer	Holly Fearnbach	AFL	.
Mammal Observer	.	AFL	.
Seabird Observer	Sophie Webb	AFL	.
Seabird Observer	Dawn Breese	AFL	.
Oceanographer	Candice Hall	AFL	.
Acoustician	Shannon Rankin	AFL	.
Acoustician	Jenna Borberg	AFL	.
Foreign Observer/Visiting Scientist	Josh Fluty	AFL	.
Foreign Observer/Visiting Scientist	Phil Morin	SWFSC	.
Foreign Observer/Visiting Scientist	TBD	.	.

McArthur II Leg 5: Panama City, Panama – San Diego, CA

Position	Name	Affiliation	Berth
Cruise Leader	Tim Gerrodette	SWFSC	.
Senior Mammal Observer	Richard Rowlett	SWFSC	.
Senior Mammal Observer	Juan Carlos Salinas	AFL	.
Mammal Observer	Erin LaBrecque	AFL	.
Mammal Observer	Anne Douglas	AFL	.
Mammal Observer	Holly Fearnbach	AFL	.
Mammal Observer	.	AFL	.
Seabird Observer	Sophie Webb	AFL	.
Seabird Observer	Dawn Breese	AFL	.
Oceanographer	Candice Hall	AFL	.
Acoustician	Julie Oswald	AFL	.
Acoustician	Carolina Bonin	Student	.
Foreign Observer/Visiting Scientist	Ta-Shana Taylor	U. Arizona	.
Foreign Observer/Visiting Scientist	Ruben Lopez Branan	Guatemala	.
Foreign Observer/Visiting Scientist	Cleridy Lennert	IATTC	.